

REMARKS

This paper is filed in response to the Office Action mailed December 7, 2005.

Claims 1-22 and 27-29 are pending in this application. The Office Action rejects claims 1, 2, 6-13, 16-17, 19 and 29 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,303,907 to Wilson (hereinafter referred to as "Wilson") in view of U.S. Patent No. 5,424,731 to Kronberg (hereinafter referred to as "Kronberg"). The Office Action rejects claims 3-5 and 19-22 under 35 U.S.C. § 103(a) as unpatentable over Wilson in view of Kronberg and further in view of U.S. Patent No. 4,667,181 to Hastreiter (hereinafter referred to as "Hastreiter"). The Office Action rejects claims 14, 15 and 18 under 35 U.S.C. § 103(a) as unpatentable over Wilson in view of Kronberg and further in view of U.S. Patent 5,151,554 to Matsuda (hereinafter referred to as "Matsuda"). The Office Action objected to claims 27 and 28 as allowable claims depending from a rejected base claim.

Applicant has amended claims 2, 6, 8, 12, 13, 14, 16, 19, 21 and 27. Applicant has also amended the specification. No new matter is added by these amendments, and support for the amendments can be found in the specification and claims as filed. Reconsideration of the claims is respectfully requested in light of the amendments above and remarks below.

Amendment to the Specification

Applicant has amended the specification to correct an error in notation with respect to Figure 4. No new matter is added by this amendment.

Claims 1-6 – § 103(a)

The rejection of claims 1, 2 and 6 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Wilson in view of Kronberg is respectfully traversed.

The rejection of claims 3-5 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Wilson in view of Kronberg and further in view of Hastreiter is respectfully traversed.

To sustain a rejection under 35 U.S.C. § 103(a), the references must teach or suggest each and every element of the claim. M.P.E.P. § 2142.

A rejection is improper under 35 U.S.C. § 103(a) if substantial reconstruction and redesign would be required, or the combination would change the principle of operation of Wilson. *See* M.P.E.P. § 2143.01 citing *In re Ratti*, 270 F.2d 810, 123 USPQ 3349 (CCPA 1959).

Because the combination of Wilson and Kronberg does not teach or suggest “wherein current amplified by the transistor in a column is sensed as a logic state” as recited in claim 1, the combination does not teach or suggest each and every element of claim 1. As the Office Action states, Wilson does not teach or suggest “wherein current amplified by the transistor in a column is sensed as a logic state.” *See* Office Action, Page 3. Further, Kronberg does not teach or suggest “wherein current amplified by the transistor in a column is sensed as a logic state.” Kronberg teaches a circuit wherein the arrangement of diodes and resistors may passively cause different amounts of current to flow through closed switches, however, Kronberg does not disclose “wherein current amplified by the transistor in a column is sensed as a logic state.” Therefore, the combination of Wilson and Kronberg does not teach or suggest each and every element of claim 1.

Further, even if the combination of Wilson and Kronberg did teach or suggest all the limitations of claim 1, modifying Wilson to incorporate amplification of currents by a transistor as recited in Kronberg would require substantial reconstruction and redesign of the Wilson device, and would change its principal of operation. The switch matrix disclosed in Wilson is digital. Because the output of the current sensing circuit, as well as its internal operation, is digital, one of ordinary skill in the art would see no need to include circuitry “wherein current amplified by the transistor in a column is sensed as a logic state” because no current needs to be amplified – the desired output of the circuit in Wilson is a digital logic level, which Wilson provides without any need of current amplification. Amplifying the logic levels generated by the Wilson device would serve no purpose and would most likely render the device inoperable. Modification of the Wilson device to require current amplification as recited in claim 1 would require

redesigning the Wilson device to operate in an analog mode, which would require a complete redesign of the current sensing circuit, an essential component of the Wilson device. Therefore, because modifying the Wilson device to include Kronberg would require substantial redesign and reconstruction, it would not be obvious to one of ordinary skill in the art to combine the references. Thus, claim 1 is patentable over Wilson in view of Kronberg.

Applicant respectfully requests the Examiner withdraw the rejection of claim 1. Because claims 2 and 6 depend from and further limit claim 1, claims 2 and 6 are patentable over the references for at least the same reason. Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claims 2 and 6.

The Office Action rejected claims 3-5 on the same basis as claims 1, 2 and 6, but also included Hastreiter to show an off-diagonal configuration having one switch per row and column intersection in all but one intersection per row. *See Office Action, page 5.* As pointed out above with respect to claims 1, 2 and 6, Wilson and Kronberg do not teach or suggest each and every element of claim 1. Hastreiter fails to cure this deficiency. Hastreiter discloses a circuit comprising diodes and switches. However, Hastreiter does not teach “wherein current amplified by the transistor in a column is sensed as a logic state.” Therefore, the combination of Wilson, Kronberg, and Hastreiter does not teach or suggest each and every element of claim 1. Because claims 3-5 depend from and further limit claim 1, claims 3-5 are patentable over the combined references for at least the same reason.

Further, even if the combination of Wilson, Kronberg, and Hastreiter did teach or suggest all the elements of claim 1, there is no motivation or suggestion to combine Wilson and Kronberg. Hastreiter does not provide the missing motivation or suggestion to combine Wilson and Kronberg, nor does Hastreiter cure the deficiency created by the lack of motivation or suggestion to combine Wilson and Kronberg. Hastreiter discloses an off-diagonal arrangement of switches and diodes, but does not teach “wherein current amplified by the transistor in a column is sensed as a logic state.” Hastreiter provides no motivation to provide current amplification in the digital circuit of Wilson. Therefore, Hastreiter does not provide the motivation to combine Wilson and Kronberg, and so

claim 1 is patentable over the combination of Wilson, Kronberg and Hastreiter. Because claims 3-5 depend from and further limit claim 1, claims 3-5 are patentable over the three combined references for at least the same reason as claim 1.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claims 3-5.

Claims 7-12 – § 103(a)

The rejection of claims 7-12 under 35 U.S.C. § 103(a) as unpatentable over Wilson in view of Kronberg is respectfully traversed.

To sustain a rejection under 35 U.S.C. § 103(a), the references must teach or suggest each and every element of the claim. M.P.E.P. § 2142.

Because the combination of Wilson and Kronberg fails to teach or suggest “wherein selection of a single row by a scan line returns column current levels from the current sensing circuit to detect if a switch at an intersection of the single row and a column of the switch matrix is closed” as recited in claim 7, the combination does not teach or suggest each and every element of claim 7. Wilson discloses a matrix of switches configured to cause a short-circuit between current sourcing and current sinking circuits. When a switch is closed, current flows between the two circuits, generating a signal for the corresponding row and column. However, the Wilson circuit does not include the concept of “scan lines,” and, as such, does not teach or suggest “wherein selection of a single row by a scan line returns column current levels from the current sensing circuit to detect if a switch at an intersection of the single row and a column of the switch matrix is closed.”

Further, Kronberg does not teach or suggest “wherein selection of a single row by a scan line returns column current levels from the current sensing circuit to detect if a switch at an intersection of the single row and a column of the switch matrix is closed” as recited in claim 7. Kronberg describes a switch matrix in which a key press is detected based upon the peak voltage values passing through a short circuit, rather than by scanning the rows of the matrix to detect current levels in each of the columns. As such, Kronberg does not teach or suggest “wherein selection of a single row by a scan line

returns column current levels from the current sensing circuit to detect if a switch at an intersection of the single row and a column of the switch matrix is closed” as recited in claim 7. Because neither reference teaches “wherein selection of a single row by a scan line returns column current levels from the current sensing circuit to detect if a switch at an intersection of the single row and a column of the switch matrix is closed” as recited in claim 7, claim 7 is patentable over the combination of Wilson and Kronberg.

Applicant respectfully requests the Examiner withdraw the rejection of claim 7. Because claims 8-12 depend from and further limit claim 7, claims 8-12 are patentable over the combination for at least the same reason as claim 7. Applicant respectfully requests the Examiner withdraw the rejection to claims 8-12.

Claims 13-18 and 29 – § 103(a)

The rejection of claims 13, 16, 17, and 29 as unpatentable over Wilson in view of Kronberg is respectfully traversed. Further, the rejection of claims 14, 15 and 18 as unpatentable over Wilson in view of Kronberg and further in view of Matsuda is respectfully traversed.

To sustain a rejection under 35 U.S.C. § 103(a), the references must teach or suggest each and every element of the claim. M.P.E.P. § 2142.

Because neither Wilson nor Kronberg teaches “amplifying a current signal; and detecting a switch status of a switch within the switch matrix based on whether the current signal in the current sensing circuit comprises at least a threshold current level, regardless of how many other of the plurality of switches are closed” as recited in amended claim 13, claim 13 is patentable over the combination of Wilson and Kronberg.

Applicant respectfully requests the Examiner withdraw the rejection to claim 13. Because claims 16, 17 and 29 depend from and further limit claim 13, claims 16, 17 and 29 are patentable over Wilson in view of Kronberg for at least the same reason as claim 13. Applicant respectfully requests the Examiner withdraw the rejection to claim 13.

The Office Action rejected claim 14 on the same basis as claim 13, but included Matsuda to show a plurality of resistors. *See* Office Action, page 6. As pointed out above with respect to claim 13, the combination of Wilson and Kronberg does not teach

or suggest “amplifying a current signal; and detecting a switch status of a switch within the switch matrix based on whether the current signal in the current sensing circuit comprises at least a threshold current level, regardless of how many other of the plurality of switches are closed” as recited in claim 14. Matsuda does not cure the deficiencies of Wilson and Kronberg. Matsuda teaches a circuit comprising switches in series with a plurality of resistors. However, combining Matsuda with Wilson and Kronberg does not teach or suggest “amplifying a current signal; and detecting a switch status of a switch within the switch matrix based on whether the current signal in the current sensing circuit comprises at least a threshold current level, regardless of how many other of the plurality of switches are closed” as recited in claim 13, from which claim 14 depends. Therefore, the combination of Wilson, Kronberg and Matsuda does not teach or suggest each and every element of claim 14.

Applicant respectfully requests the Examiner withdraw the rejection of claim 14. Because claims 15 and 18 depend from and further limit claim 14, claims 15 and 18 are patentable over the combination of Wilson, Kronberg, and Matsuda for at least the same reason as claim 14. Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claims 15 and 18.

Claims 19-22 – § 103(a)

The rejection of claim 19 as unpatentable over Wilson in view of Kronberg is respectfully traversed. Further, the rejection of claims 19-22 as unpatentable over Wilson in view of Kronberg and further in view of Hastreiter is respectfully traversed.

To sustain a rejection under 35 U.S.C. § 103(a), the references must teach or suggest each and every element of the claim. M.P.E.P. § 2142.

Because neither Wilson nor Kronberg teaches or suggests

“wherein the output signal comprises at least the threshold level only if a scanned switch at an intersection of the selected row and a scanned column of the switch matrix is selected, wherein the scanned column is coupled to the second scan line; and each of the other bi-directional scan lines of the plurality of bi-directional scan lines is configured to conduct a

second signal associated with a second logic state opposite the first logic state”

as recited in claim 19, claim 19 is patentable over the combination of Wilson and Kronberg. Wilson teaches using a current-sourcing circuit in combination with a current-sinking circuit detect the state of a switch. The Wilson device does not teach or suggest scanning a row to read switch states. Instead, changes in switch states generate output signals. Input signals are not accepted by the Wilson device, and, therefore, Wilson does not teach or suggest scan lines.

Further, Kronberg teaches a switch matrix in which a key press is detected based upon the peak voltage values passing through a closed switch, rather than by scanning the rows of the matrix to detect current levels in each of the columns. Therefore, the combined references do not teach or suggest each and every element of claim 19.

Applicant respectfully requests the Examiner withdraw the rejection to claim 19 based on the combination of Wilson and Kronberg.

Further, Hastreiter does not cure the deficiencies of Wilson and Kronberg. Hastreiter teaches an off-diagonal configuration of rows and columns. But combining Hastreiter with Wilson and Kronberg does not teach or suggest

“wherein the output signal comprises at least the threshold level only if a scanned switch at an intersection of the selected row and a scanned column of the switch matrix is selected, wherein the scanned column is coupled to the second scan line; and each of the other bi-directional scan lines of the plurality of bi-directional scan lines is configured to conduct a second signal associated with a second logic state opposite the first logic state”

as recited in claim 19. Because the combination of Wilson, Kronberg, and Hastreiter does not teach or suggest each and every element of claim 19, claim 19 is, therefore, patentable over the combined references.

Applicant respectfully requests the Examiner withdraw the rejection of claim 19. Further, because claims 20-22 depend from and further limit claim 19, claims 20-22 are patentable over the combination of Wilson, Kronberg, and Hastreiter for at least the same

reason. Applicant respectfully requests the Examiner withdraw the rejection to claims 20-22.

Claims 27 and 28 – Objections

Claims 27 and 28 were objected for depending from rejected base claim 13, but otherwise claiming allowable subject matter. As pointed out above, Claim 13 is patentable over the cited references. Therefore, claims 27 and 28 are also patentable for at least the same reason. Applicant respectfully requests the Examiner withdraw the objection to claims 27 and 28.

Prior Art Made of Record and Not Relied Upon

In the conclusion, the Office Action lists references which were made of record and not relied upon. Applicant respectfully traverses the relevance and characterization of these references as prior art or otherwise, and respectfully reserves the right to present such arguments and other material should the Examiner maintain rejection of Applicant's claims, based upon the references made of record and not relied upon or otherwise.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable, and Applicant respectfully requests the allowance of all claims.

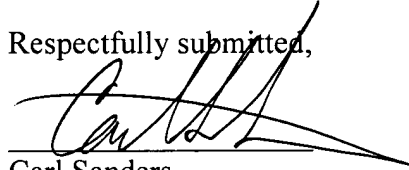
Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

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3/7/2006

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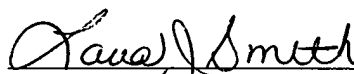
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